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Distribution, Movements and Seasonal Use Areas of Radio-Tagged Dall Sheep in the White Mountains-Tanana Hills, Alaska, 1983-1989

Bruce M. Durtsche, Winston Hobgood and Jan Burris

BLM-Alaska Open File Report 30
November 1990

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INTRODUCTION

The presence of Dall sheep in the White Mountains-Tanana Hills has been documented historically. Periodic aerial surveys to obtain population size and composition information (Jones 1960,1961,1962; Smith 1970,1977; Haggstrom 1982; Crain 1986) have been conducted by the Alaska Department of Fish and Game (ADF&G). Earlier population studies as far back as 1950 were conducted by the U.S. Fish and Wildlife Service (Gross 1963). Dall sheep distribution and movements data in the White Mountains-Tanana Hills are limited but current information indicates there is less distribution and movement than in the past when compared to historical distribution information. Gross (1963) restricted his observations to Victoria Mountain and Mount Schwatka. Haggstrom (1982) delineated spring and mid-summer distribution based on aerial surveys. Lack of Dall sheep distribution and movement information needed for Bureau of Land Management (BLM) resource management planning and decision-making for the White Mountains National Recreation Area (WMNRA) and Steese National Conservation Area (SNCA) in the Tanana Hills provided the impetus to obtain detailed data concerning Dall sheep use and movements. BLM and ADF&G cooperatively conducted investigations to determine distribution, movements and important Dall sheep seasonal use areas in the White Mountains-Tanana Hills.

METHODS

Dall sheep were captured using a Bell 206B or Hughes 500-D helicopter and a Cap-Chur dart gun with standard capture techniques previously used by ADF&G. A PA-18 airplane was used to locate and guide the helicopter to Dall sheep. The airplane occupants also observed darted animals and communicated each animal's status to the helicopter by radio. M99 (Etorphine: 2.5 mg dosage and Acepromazine (7.5 mg dosage) injected intramuscularly were used for immobilization (3 cc dart) and M50-50 (Diprenorphine: 5 mg dosage) injected intravenously was administered for recovery. Telonics, Inc., receivers and radio collars were used. Canvas and vinyl identification collars (red, blue and orange) were riveted to radio collars to facilitate visual recognition of individual Dall sheep.

Monitoring surveys to relocate collared animals and for general reconnaissance were flown in fixed-wing aircraft (PA-18, C-180 and C-185). Surveys were flown 1 or more times every 2 weeks between April 1 and October 31, and 1 or more times monthly between November 1 and March 31 each year. Relocation survey information included location, presence of lambs, group size, vegetation, sheep trails and other use observations. Information was recorded on pre-printed data forms and 1:250,000-scale USGS quad maps. Location data were transferred to 1:63,000-scale USGS quad maps immediatly after survey flights for later analysis.

Population surveys were conducted by ADF&G. A PA-18 aircraft with pilot and observer flew contours in alpine and subalpine areas known to contain sheep habitat. Sheep found were enumerated and classified. Accuracy of counts between 1986 and 1989 were assessed by comparing the number of radio collars observed with total numbers of collars worn by collared sheep. Comprehensive population surveys were not conducted in 1987 and 1988. In those years, group composition data from multiple observations of radio collared individuals were used to calculate sex and age percentages by summing the numbers of each sex and age group within the observation made on one individual for that year, and across all radio-collared individuals.

RESULTS AND DISCUSSION

Fifteen Dall sheep were radio-collared in the White Mountains-Tanana Hills in 1983 and 1985. The collared sheep consisted of 11 ewes and 4 rams. All sheep provided sufficient data to be incorporated into results (Table 1); 3 sheep were captured on Victoria Mountain on April 21, 1983; 3 on Rocky Mountain (formerly known as Lime Peak) on April 21, 1983; 5 on West Point on April 21, 1985; and an additional 4 were captured on Rocky Mountain on June 3, 1985 (Table1). Ninety-eight survey flights to relocate radio-collared Dall sheep were flown between April 21, 1983, and July 5, 1988. These relocation surveys resulted in 566 relocations (Table 1).

Table 1. Identification, number of relocations, and general location of individual collared Dall sheep in the White Mountains-Tanana Hills.

ID #	Sex	Frequency	Number Locations	Date Collared	Location
S-1	F	150.165	n=58	4/21/83	Victoria Mountain
S-2	F	150.175	n=09	4/21/83	Rocky Mountain
S-3	F	150.185	n=58	4/21/83	Rocky Mountain
S-4	F	150.306	n=25	4/21/83	Rocky Mountain
S-5	M	150.396	n=25	6/03/85	Rocky Mountain
S-6	M	150.406	n=48	6/03/85	Rocky Mountain
S-7	M	150.436	n=42	4/21/85	West Point
S-8	M	150.446	n=28	4/21/85	West Point
S-9	F	150.455	n=45	4/21/85	West Point
S-10	F	150.465	n=42	4/21/85	West Point
S-11	F	150.476	n=44	4/21/85	West Point
S-12	F	150.555	n=50	6/03/85	Rocky Mountain
S-13	F	150.565	n=42	6/03/85	Rocky Mountain
S-14	F	150.710	n=35	4/21/83	Victoria Mountain
S-15	F	150.720	n=15	4/21/83	Victoria Mountain

Individual sheep associated themselves with one of several bands present in the 3 regions where sheep were collared. For this reason, determination of use areas, movement routes and distribution resulting from this study (Figure 1) are in part a function of timing and location of the initial sheep collaring. However, ancillary observations associated with radio-location flights, one university study in the late 1950s and erratic population surveys over the last 40+ years, indicate that this study's results are fairly accurate in determining distribution, movements and seasonal use areas. If the present trend of population increase continues, new bands will form and new areas will be utilized as carrying capacity is reached on present range. Evidently, population numbers were much higher in the past and range exceeded present levels (Bill Lentsch, personal communication).

Intermingling of bands appears to occur with certainty during at least one period of the year. Radio-collared rams or ewes from different bands occupied the same areas during prerut and rut in all years of this study. In each of the three isolated use regions, separate bands utilized disjunct ranges for most of the year. For example, Mount Prindle, Rocky

Mountain and the Limestone Jags near Beaver Creek, together comprise a distinct, isolated sheep range. Radiotelemetry data indicated that at least 1 band of ewes and lambs utilized each sub-unit. A sheep associated with a band using Mount Prindle in summer would tend to remain in that area, even in winter. The same was true for a sheep in the Limestone Jags area near Beaver Creek. During the prerut and rut period, from late September to early December, bands in each of the 3 regions mingled each year of this study. When the rut was over, bands and sheep returned to their favored areas. Intrasex overlap of band habitat use appears to be minimal for most of the year, with bands of ewes and rams often occupying the same range, but differing in temporal use. Some mixing and movement that occurs during other times of the year is not predictible with current information.

Notable shifts in ram use areas occurred during sheep hunting season each year. Movements were away from easy access points, and lasted the duration of the sheep hunting season. This explains ADF&G Hunter Harvest Reports that indicate that most successful sheep hunters use aircraft as their primary means of transportation and take their sheep on the first day or two of the season.

Relocation data indicate that the Mount Prindle/Rocky Mountain area contains at least 3 bands of ewes and 2 bands of rams. The Mount Schwatka/Victoria Mountain area has at least 3 bands of ewes and 1 band of rams. The South Fork Birch Creek/ West Point area has at least 2 bands of ewes and 1 band of rams.

Some exchange of sheep between the Limestone Jags, along the western border of the WMNRA, and the Victoria/Mount Schwatka region to the north is believed to occur. This is based on a solitary sighting of a sheep crossing Beaver Creek in summer 1981 by BLM personnel (Billy Butts, personal communication). It appears that a trail leads down from the uplands (ridge system associated with Mount Victoria) in T. 11N., R. 2E., sec. 36 to Beaver Creek. A sheep was observed crossing the creek to T. 10N., R. 2E., sec. 1 and, theoretically, to the uplands and ridges of the Limestone Jags to the east. The sheep was believed to be a young ram.

There are no indications that sheep in the Tanana Hills/West Point region interact with populations in the Fortymile District, 20 to 25 miles east. It is highly likely that sheep populations in the White Mountains, Mount Schwatka and Tanana Hills/South Fork Birch Creek areas have unique gene pools compared to other Alaskan populations, due to their isolation. It would be interesting to determine the relationship among these populations and among other populations in Alaska.

DISTRIBUTION, MOVEMENTS AND USE AREAS

Victoria Mountain/Mount Schwatka

Overall distribution, movements and seasonal use areas of radio-collared Dall sheep using Victoria Mountain/Mount Schwatka are presented in Figure 1. Earliest lamb detection occurred on May 10, with most births occurring between May 15 and May 30. Lambing took place on Victoria Mountain and the ridge complex in the upper Jefferson Creek/upper Big Creek/ Mount Schwatka landscape. Movements to lambing and lick areas across Victoria Mountain and Victoria Creek usually occurred from late May to mid-June. Sheep used mineral licks (Figure 1) in the headwaters of Jefferson Creek and along Victoria Creek north of Victoria Mountain. Movements across Victoria Creek to Victoria Mountain usually occurred during late September to late October in anticipation of the rut. The major breed-

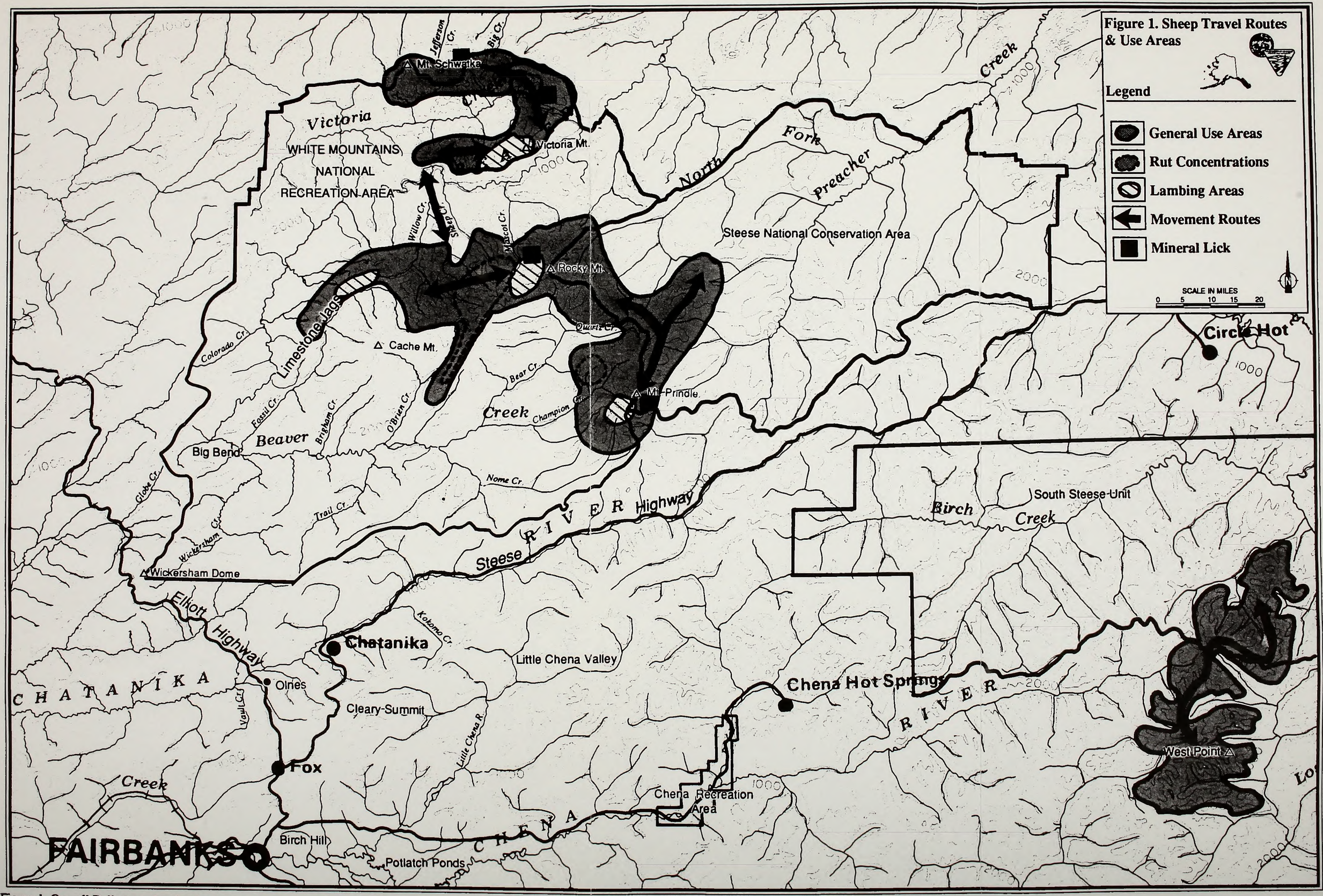

Figure 1. Overall Dall sheep distribution and use areas.

ing area for this region appears to be due east of Mount Schwatka and due north of Mount Victoria. Winter use areas were located on Victoria Mountain and on the ridge areas north and east of Mount Schwatka (Figure 2).

Sheep often spent time in the summer in wooded areas associated with a small, sharp ridge adjacent to Victoria Creek, directly north of Victoria Mountain, and in association with small steep meadows below treeline on south-facing slopes just above Victoria Creek. This behavior is highly unusual since protection from predators would seem minimal. It may also explain anomolies in population surveys discussed by Gross (1963) since these sheep were very difficult to locate from the air even with the assistance of a radio collar. Pawed-out patches of ground and frequent use of these meadows may indicate mineral licks. Sheep appeared to move freely between Mount Schwatka and Mount Victoria and the separation between bands seems to be less distinct in this region than in the others studied. For example, a particular radio-collard ewe might be located one week accompanied by a group containing no other radio-collared animals. The next week, the same ewe might have be located in a group containing another radio-collared ewe. Since it was impossible to distinguish individual sheep, other than those wearing radio collars, there was no way to accurately determine the exact composition and thus the dynamics of the group.

Rocky Mountain/Mount Prindle

Distribution, use areas and movement routes of radio-collared Dall sheep using the Rocky Mountain/Mount Prindle area are presented in Figure 1. Earliest detection of lambs occurred on May 10, with most births occuring between May 15 and May 30. Lambing took place in the headwaters of Mascot Creek west of Rocky Mountain, and in the ridge complex surrounding Mount Prindle. Movements by ewes to lambing areas and summer range across Quartz Creek headwaters and Willow Creek headwaters usually occurred from late May to mid-June. Sheep used mineral licks in upper Mascot Creek and Preacher Creek (Figure 1). Fall movements to rut areas usually occurred from late September to late October. Additional movements to winter range by rams occurred during late November and December. Winter use areas were located on Rocky Mountain, VAMB Fossil and the Willow Creek headwaters (Figure 2).

South Fork Birch Creek/West Point

Overall distribution, use areas and movement routes of radio-collared Dall sheep using the South Fork Birch Creek/West Point area are presented in Figure 1. Earliest detection of lambs occurred between May 15 and May 30. Lambing took place in the Puzzle Gulch/Big Windy Creek area and the ridge complex surrounding West Point. Some ewes moved across the ridge complexes between West Point and the Puzzle Gulch area. Fall movements to rut and winter use areas usually occurred from late September to late October. Additional movements by rams to winter range occurred during late November through December. Winter use areas were located in the Big Windy Creek-Puzzle Gulch areas and the North Fork Salcha River/East Fork Chena River headwaters west and northwest of West Point (Figure 2).

POPULATION DYNAMICS

Comparison of total sheep observed in 1970 (285) and 1982 (132) indicates a 54% reduction in total number of sheep in the White Mountains from 1970 to 1982 (Figure 3). A rise in the population level was detected in 1986, when 240 sheep were counted. It appeared

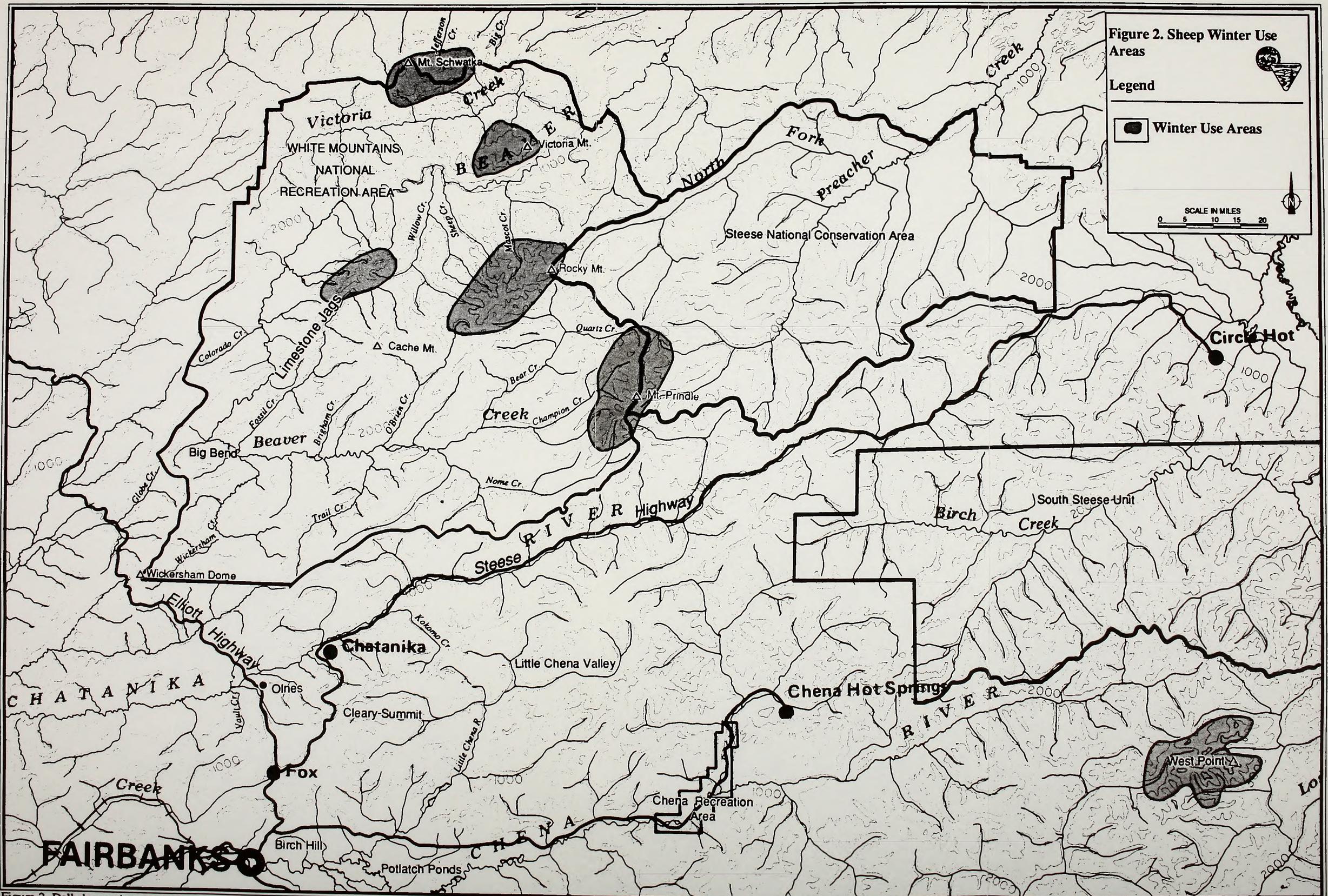

Figure 2. Dall sheep winter use areas.

that the population was increasing and had rebounded as numbers approached 1970 levels. The survey was repeated in 1989. A count of 237 sheep verified 1986 observations that population numbers had increased and that the higher level was being maintained.

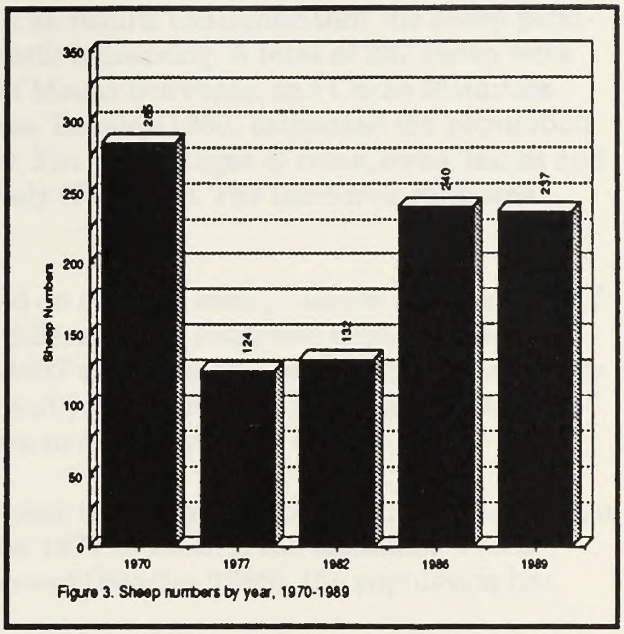

Figure 3. Sheep numbers by year, 1970-1989

In 1970, of the 285 sheep counted, 15% were rams, 60% ewes, 25% lambs, and 0 yearlings (Figure 4). The absence of yearlings is assumed to be due to their strong resemblance to ewes, which also means that ewe numbers are probably somewhat inflated. The lamb to ewe ratio was 41:100 (Figure 5).

The next survey, conducted in 1977, revealed a sharp drop in population numbers from 285 to 124 (Figure 3). This represents a 56% decline in total numbers. Although the percent of rams in the population doubled, reaching 31%, the percent of ewes and lambs decreased by 13% and 9% respectively. Actual percentages were 53% ewes and 16% lambs (Figure 6). The lamb:ewe ratio also declined to 30:100 (Figure 4).

Five years later, in 1982, 132 sheep were counted. There were 34% rams, 58% ewes and 8% lambs—the lowest percentage of lambs recorded during the years 1970-1989 (Figures 4). In addition, the lamb:ewe ratio in 1982 was only 13:100, a drop of 18% from 1977 (Figure 4).

By 1986, a substantial population rise was documented with a count of 240 sheep (Figure 3). Percentage of rams was 25% and ewes 55%, a decrease from 1982, but lambs represented 20% of the population (a 12% rise over 1982) and lamb:ewe ratios were 37:100 (Figure 4).

Comprehensive population surveys were not conducted in 1987 and 1988. In those years, group composition data from multiple observations of radio-collared individuals were used to calculate sex and age percentages by summing the numbers of each sex and age group within the observation made on one individual for that year, and across all radio-collared individuals. By this method, 36.5% rams, 46.6% ewes, 16.4% lambs and .5% yearlings were calculated in 1987; and 22% rams, 53% ewes, 21% lambs and 4% yearlings were calculated in 1988 (Figure 4).

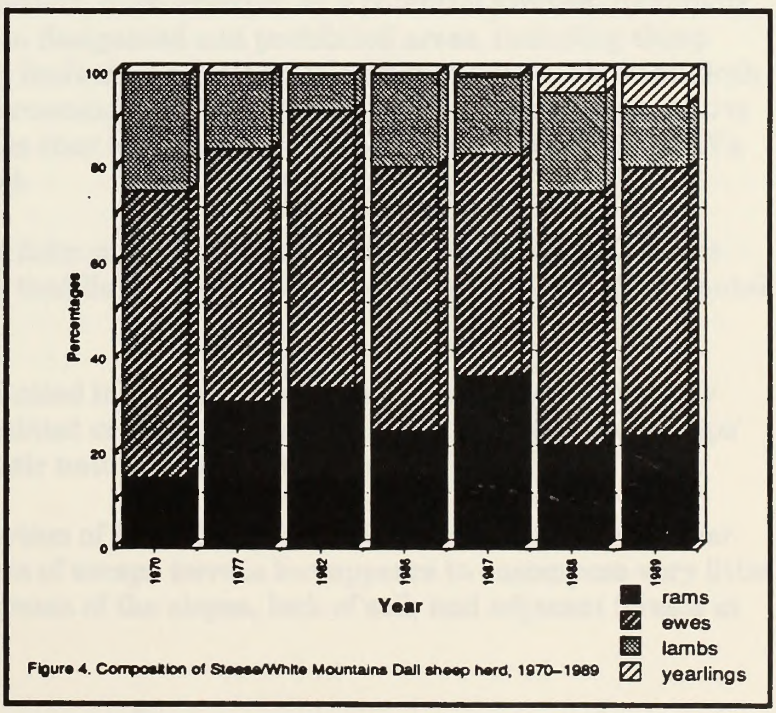

Figure 4. Composition of Steese/White Mountains Dall sheep herd, 1970–1989

The most recent survey was in August 1989. The results concluded that the sheep population was at least holding steady, and possibly still increasing. A total of 237 sheep were seen, however Victoria Mountain and portions of Mount Schwatka and Cache Mountain were not surveyed due to poor weather conditions. Beasley(1989) estimated the population level to be in the range of 250-300 sheep in 1989. The percentages of rams, ewes, lambs and yearlings were 24%, 56%, 13% and 8% respectively (Figure 4). The lamb:ewe ratio was estimated to be 23:100 (Figure 4).

In 1987 and 1988, when ratios were calculated on collared ewes, 5 lambs were seen per 7 ewes, resulting in 71.4% ewes with lambs. The differences in lamb:ewe ratios between collared ewes and group composition figures in 1987 and 1988 are indicative of inflated ewe numbers due to the resemblance between ewes and yearling rams. This probably resulted in lower than actual estimates in lamb:ewe ratios in all years.

Although sex and age composition vary from year to year, population numbers have risen steadily since 1977, showing a 48% increase from 1977 to 1989. If the estimates which include areas missed due to poor weather are correct (Beasley 1989), the population has once again reached its 1970 level.

MANAGEMENT IMPLICATIONS

The Steese/White Mountains sheep population is very important to the recreating public because of its proximity to Fairbanks, the second largest community in Alaska, and its accessibility by road, aircraft and river. The White Mountains National Recreation Area is extremely important to the sheep population because virtually all their seasonal ranges are contained within its boundaries. The Alaska Department of Fish and Game currently manages the population with the goal, "to provide an opportunity to hunt sheep under aesthetically pleasing conditions." The present "full curl only" hunting constraint is probably sufficient to limit harvest and fulfill current consumptive and nonconsumptive needs. ADF&G is targeting a population level of at least 250 sheep that will sustain an annual harvest of 4 full-curl rams.

Off-road vehicles, especially 4-wheelers, have emerged as a potential problem by rapidly expanding the existing trail system in designated and prohibited areas, including sheep range. The problem is aggravated by limited monitoring and enforcement capabilities. Both monitoring and ORV regulation enforcement should be strengthened. As both consumptive and nonconsumptive uses increase, as they have recently, problems associated with ORVs, access and trail use will be magnified.

Mineral licks, especially the large licks on Jefferson and Mascot creeks, are important year-round use centers. Any activity that limits sheep use of these areas will be detrimental to the sheep populations.

Because escape terrain appears limited in the Rocky Mountain (Lime Peak) area, any reduction in the amount of escape habitat or access to escape habitat will limit the sheeps' ability to protect themselves from their natural predators, including humans.

The Limestone Jags area, that portion of the White Mountains bordering lower Beaver Creek on the east, contains a plethora of escape terrain but appears to encompass very little foraging habitat because of the steepness of the slopes, lack of soil, and adjacent forests at lower elevations.

It could be that the lack of forage habitat was aggravated by strict fire control over the last 30 years, which may have allowed occupation and encroachment of spruce forests on former grazing range. However, the approximately 35,000 acre Brigham fire of 1987 destroyed much of the forest on the southern end and eastern flank of the Limestone Jags. While this may have been visually undesireable short-term, there will be positive short- and long-term effects for sheep and other ungulates, such as moose; as well as for bears, raptors, terrestial furbearers and microtine rodents. Monitoring is warranted to document how sheep utilize the recently burned portion of their range.

Sheep were observed to spend a good deal of time in forested areas at a lick near Victoria Creek and otherwise in the general vicinity of Victoria Creek between Mount Victoria and Mount Schwatka. This location constitutes an important movement and use corridor. Fire may benefit these sheep by increasing visibility in an area with limited escape terrain, allowing increased time to react to predators. Spruce tree cores collected nearby indicate the trees are about 300 years old. Yarie (1981) found that stands over 200 years comprised less than 1% of 371 stands sampled in the Porcupine River drainage of interior Alaska.

The efficacy of prescribed fire should be evaluated for benefits to sheep and their habitat in terms of predator avoidance, habitat improvement and habitat expansion. Forest encroachment on former sheep range may be a limiting factor in some portions of the White Mountains National Recreation Area.

Sheep in the White Mountains proper and the Mount Schwatka area are relatively isolated. A limited amount of movement, and thus genetic exchange, appears to occur between the two areas. To maintain the integrity of the sheep in both areas, the two populations need to exchange genetic material, so it is important to maintain the known movement route between them, and along with any other movement routes that may exist. WMNRA sheep are isolated from other sheep populations and may be genetically distinct. They may be the most isolated sheep population in Alaska.

The Steese National Conservation Area sheep population in the West Point vicinity is the most isolated in terms of access. It is virtually inaccessible by plane or boat, and is very far from the road system. Hunting pressure, as a result, is minimal to nonexistant.

Although undocumented, a limited exchange of animals between the SNCA population and the Charley River population probably occurs, especially during periods of higher population numbers. This area seems capable of supporting more than the small number (9-20) of sheep that has occupied the area in the last several years. Although escape terrain is limited in much of the area, other recondite factors that are suppressing the present population must be in operation. Potential negative impacts to the sheep in this area would likely result from mineral exploration and extraction. The present situation is expected to continue into the foreseeable future. The only known site approximating the criteria for a mineral lick is the Big Windy hot spring, which has already been set aside as a research natural area.

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BLM Mission Statement

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